WE CLAIM:

1. Apparatus for recognizing an input data stream, comprising:

a receiver for receiving the input data stream;

an interface for randomly selecting any one portion of the received data stream, and forming a first plurality of feature time series waveforms corresponding to spectrally distinct portions of the received data stream;

a memory for storing a second plurality of feature time series waveforms; and

processor structure for correlating the first plurality of feature time series waveforms with the second plurality of feature time series waveforms, and for designating a recognition when a statistic of correlation values between the first plurality of feature time series waveforms and one of the second plurality of feature time series waveforms reaches a predetermined value.

2. Apparatus according to Claim 1, wherein the data stream comprises audio data.

3. Apparatus according to Claim 1, wherein said data stream comprises video data.

4. Apparatus according to Claim 1, wherein said memory stores a second plurality of feature time series waveforms, which correspond to an entire broadcast work.

5. Apparatus according to Claim 1, further comprising a scheduler for switching said receiver to a different input data stream after said processor designates the recognition.

6. Apparatus according to Claim 1, wherein said interface selects a plurality of overlapping portions of the received data stream to form the first plurality of feature time series waveforms.

7. Apparatus according to Claim 1, wherein said interface rank-orders the first plurality of feature time series waveforms according to their information content.

8. Apparatus according to Claim 1, wherein said processor structure correlates the most descriptive feature of the first plurality of feature time series waveforms with each time segment of each of the second plurality of feature time series waveforms stored in memory.

9. Apparatus according to Claim 1, wherein said receiver normalizes the input data stream to a fixed total power.

10. Apparatus according to Claim 1, wherein said interface performs a fast Fourier transformation on the received data stream to produce the first plurality of feature time series waveforms.

11. Apparatus according to Claim 1, wherein said interface integrates the received data stream over each of a plurality of spectral parameters and then performs a polyphase decimating filter function on the integration result to produce the first plurality of feature time series waveforms.

12. Apparatus according to Claim 1, wherein said processor structure designates a recognition which includes a time position of the first plurality of feature time series waveforms within the received input data stream.

13. Apparatus according to Claim 1, wherein the input data stream comprises a broadcast work, and wherein the processor structure correlates (i) the first plurality of feature time series waveforms which represents any randomly-selected portion of the broadcast work, and (ii) the second plurality of feature time series waveforms which represents the entire broadcast work.

14. Apparatus according to Claim 1, wherein said processor correlates the first plurality of feature time series waveforms with the second plurality of feature time series waveforms by computing the plurality of partial pattern recognitions between the first plurality of feature time

series waveforms and templates which correspond to the second plurality of features time series waveforms, said processor estimating false alarm probabilities for each of the first plurality of feature time series waveforms, said processor statistically combining said probabilities to estimate an overall probability that a possible detection is random.

15. Apparatus according to Claim 1, wherein said memory stores the second plurality of features time series waveforms which are time-overlapped with respect to each other, and wherein said processor zero-fills each of the first plurality of feature time series waveforms to double their lengths prior to correlation.

16. Apparatus according to Claim 1, wherein said processor designates a plurality of potential recognitions after a plurality of correlation probability values reaches the predetermined value, said processor then repeating the correlating and designating functions until only one of the second plurality of feature time series waveforms is designated as corresponding to the input data stream.

17. Apparatus for forming video features from an input stream, comprising:

a receiver for receiving an input video stream which corresponds to a video screen having a plurality of regions, the video screen comprising a plurality of pixels having intensity and color; and

processor structure for (i) receiving the video stream from the receiver, (ii) integrating at least one of the intensity and the color of video signals corresponding to each of the plural areas of the video screen, (iii) forming a set of low rate time series data streams from the integrated video signals, (iv) forming overlapping time intervals of the multiple feature streams such that the overlapping time intervals encompass the entire received video frame sequence, (v) determining the most distinctive information from each time interval, (vi) rank-ordering the time interval segments according to their distinctness, (vii) transforming the rank-ordered time interval segments to produce complex spectra, and (viii) storing the formed data as video features.

18. Apparatus according to Claim 17, wherein the processor forms the set of low rate time series data streams by polyphase-decimating-filtering the integrated video signal.

19. Apparatus for forming audio features from an input audio stream, comprising:

a receiver for receiving the input audio stream and separating the received audio stream into a plurality of different frequency bands; and

processor structure for (i) extracting energy from each of the plurality of frequency bands, (ii) integrating the energy extracted from each of the plurality of frequency bands, (iii) forming multiple feature streams from the integrated energy, (iv) forming overlapping time intervals of the multiple feature streams such that the overlapping time intervals encompass the entire received audio stream, (v) determining the most distinctive information from each time interval, (vi) rank-ordering the time interval segments according to their distinctness, and (vii) transforming the rank-ordered time interval segments to produce complex spectra; and

a memory for storing the transformed complex spectra.

20. A method for recognizing an input data stream, comprising the steps of:

receiving the input data stream;

randomly selecting any one portion of the received data stream;

forming a first plurality of feature time series waveforms corresponding to spectrally distinct portions of the received data stream;

storing a second plurality of feature time series waveforms;

correlating the first plurality of feature time series waveforms with the second plurality of feature time series waveforms; and

designating a recognition when a correlation probability value between the first plurality of feature time series waveforms and one of the second plurality of feature time series waveforms reaches a predetermined value.

21. A method for forming video features from an input video stream, comprising the steps of:

receiving an input video stream which corresponds to a video screen having a plurality of regions, the video screen comprising a plurality of pixels having intensity and color;

integrating at least one of the intensity and the color of video signals corresponding to each of the plural areas of the video screen;

forming a set of low rate time series data streams from the integrated video signal;

forming overlapping time intervals of the multiple feature streams such that the overlapping time intervals encompass the entire received video stream;

determining the most distinctive information from each time interval;

rank-ordering the time interval segments according to their distinctness;

transforming the rank-ordered time interval segments to produce complex spectra; and

storing the transformed complex spectra as video features.

22. A method for forming audio features from an audio stream, comprising the steps of:

receiving the input audio stream and separating the received audio stream into a plurality of different frequency bands;

extracting energy from the plurality of frequency bands;

integrating the energy extracted from each of the plurality of frequency bands;

forming multiple feature streams from the integrated energy;

forming overlapping time intervals of the multiple feature streams such that the overlapping time intervals encompass the entire received audio stream;

determining the most distinctive information from each time interval;

rank-ordering the time interval segments according to their distinctness;

transforming the rank-ordered time interval segments to produce complex spectra; and

storing the transformed complex spectra as audio features.

23. A computer readable storage medium for storing a program which causes one or more computers to recognize an input data stream, the stored program causing the one or more computers to:

receive the input data stream;

randomly select any one portion of the received data stream;

form a first plurality of feature time series waveforms which corresponds to spectrally distinct portions of the received data stream;

store a second plurality of feature time series waveforms;

correlate the first plurality of feature time series waveforms with the second plurality of feature time series waveforms; and

designate a recognition when a correlation probability value between the first plurality of feature time series waveforms and one of the second plurality of feature time series waveforms reaches a predetermined value.

24. A computer readable storage medium which stores a program which causes one or more computers to form video features from an input video stream, the program causing the at least one computer to;

receive an input video stream which corresponds to a video screen having a plurality of regions, the video screen comprising a plurality of pixels having intensity and color;

integrate at least one of the intensity and the color of video signals corresponding to each of the plural areas of the video screen;

form a set of low rate time series data streams from the integrated video signal;

form overlapping time intervals of the multiple feature streams such that the overlapping time intervals encompass the entire received video frame sequence;

determine the most distinctive information from each time interval;

rank-order the time interval segments according to their distinctness;

transform the rank-ordered time interval segments to produce complex spectra; and

stores the transformed complex spectra as video features.

25. A computer-readable storage medium which stores the program that causes one or more computers to form audio features from an audio stream, the program causing the one or more computers to:

receive the input audio stream and separating the received audio stream into a plurality of different frequency bands;

extract energy from the plurality of frequency bands;

integrate the energy extracted from each of the plurality of frequency bands;

form multiple feature streams from the integrated energy;

form overlapping time intervals of the multiple feature streams such that the overlapping time intervals encompass the entire received audio stream;

determine the most distinctive information from each time interval;

rank-order the time interval segments according to their distinctness;

transform the rank-ordered time interval segments to produce complex spectra; and

store the transformed complex spectra as audio features.

26. A method for forming recognition features from an input data stream, comprising the steps of:

receiving the input data stream;

forming a plurality of feature time series waveforms which correspond to spectrally distinct portions of the received input data stream;

forming multiple feature streams from the plurality of feature time series waveforms;

forming overlapping time intervals of the multiple feature streams;

estimating the distinctiveness of each feature in each time interval;

rank-ordering the features according to their distinctiveness;

transforming the feature time series to obtain complex spectra; and

storing the feature complex spectra as the recognition features.

27. A method of using recognition features from an input data stream to achieve automatic signal identification, comprising the steps of:

receiving the input data stream;

forming a plurality of time series waveforms which correspond to all features of the received input data stream;

forming multiple feature streams from the plurality of feature time series waveforms;

correlating the most distinctive feature of each stored pattern with the corresponding feature formed from the unknown input data stream;

estimating the probability that the resulting correlation value could occur from a random event;

rejecting a candidate pattern if the probability of random detection is above a specified rejection threshold;

accepting a candidate pattern if the probability of random detection is below a specified acceptance threshold;

for unresolved patterns, performing additional correlations with additional features in an order specified by the distinctiveness of each feature;

for unresolved patterns, estimating the combined (joint) probability of random pattern detection;

rejecting a candidate pattern if the combined probability of random detection is above a specified rejection threshold;

accepting a candidate pattern if the combined probability of random detection is below a specified acceptance threshold;

repeating the steps of correlating additional features, updating the combined probability of random detection, and evaluating combined probabilities until a decision can be made for every candidate pattern.